

Vehicle Scrutinizing using GPS & GSM Technologies Implemented with Arduino controller

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ABSTRACT: Vehicle Scrutinizing is now one of the most popular technological changes in all over the world that is going to make our personal and business life lot easier. As the term suggests, it enables one to survey or oversee the location of vehicle in instant time with ANDROID APPLICATION. Vehicle scrutinizing system is a software & hardware system enabling the vehicle owner to track the position of their vehicle. Primarily, the system functions with the Global Positioning System (GPS), traditional cellular network such as Global System for Mobile Communications (GSM). Detailed vehicle location reports enhance your control over movement of goods. Monitor the speed and stoppage points in real-time and calculate the distance travelled and duration of stoppage, optimize fuel cost that improve efficiency by reducing operational cost can be obtained from a central operating centre through mobile phones or Internet. Getting real-time and playback data visualization. In this project ARDUINO series microcontroller is used for interfacing to various hardware peripherals. The current design is an embedded application, which will continuously monitor a moving vehicle and report the status of the vehicle on demand. For doing so an ARDUINO series microcontroller is interfaced serially to a GSM Modem and GPS Receiver. A GSM modem is used to send the position (Latitude and Longitude) of the vehicle from a remote place. The GPS modem will continuously give the data i.e. the latitude and longitude indicating the position of the vehicle. The GPS modem gives many parameters as the output. The same data is sent to the mobile at the other end from where the position of the vehicle is demanded and also internal memory(EEPROM) is used to store the mobile number and demanded data.

KEYWORDS: Vehicle Scrutinizing, GSM, GPS, Arduino Microcontrollers, Mobile SMS/Internet.

I. INTRODUCTION

Vehicle Scrutinizing is now one of the most popular technological changes in all over the world that is going to make our personal and business life lot easier. As the term suggests, it enables one to survey or oversee the location of vehicle in instant time. Scrutinizing and managing the mobile assets are very important for any company dealing with the services, delivery or transport vehicles. Information technologies help in supporting these functionalities from remote locations and update the owner's with the latest information of their mobile assets. A new business tool for fleet managers.

A vehicle scrutinizing system combines the installation of an electronic device in a vehicle, or fleet of vehicles, with purpose-designed computer software to enable the owner or a third party to track the vehicle's location, collecting data in the process. Modern vehicle tracking systems commonly use Global Positioning System (GPS) technology or GLONASS technology for locating the vehicle, but other types of automatic vehicle location technology can also be used. Vehicle information can be viewed through SMS. In the main they are easy to steal, and the average motorist has very little knowledge of what it is all about. To avoid this kind of steal we are going to implement a system it provides more security to the vehicle and all its operations.

Both consumer and commercial vehicles can be outfitted with RF or GPS units to allow police to do tracking and recovery.

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In the case of LoJack, the police can activate the tracking unit in the vehicle directly and follow tracking signals. You can investigate your vehicle by calling to the driver over mobile phone but this not convenient as your driver might give you false information. So, at any time you won't be 100% sure about the location and status of the vehicle. Here, vehicle scrutinizing using GPS and GSM provides the solution to monitor your vehicle location in real-time and provide better control over your assets. Receive alert messages from the vehicle operator and so better access for preventive measures and medical or technical assistance in case of accident or vehicle breakdown, thereby saving life and asset. Better security for driver as well as travellers by enabling faster location of vehicles and response to accidents and better operational decisions towards the tours due to sudden developments like bad weather, roadway closings and accidents.

Vehicle scrutinizing system is a software & hardware system enabling the vehicle owner to track the position of their vehicle. Primarily, the system functions with the Global Positioning System (GPS), traditional cellular network such as Global System for Mobile Communications (GSM). Detailed vehicle location reports enhance your control over movement of goods. Monitor the speed and stoppage points in real-time and calculate the distance travelled and duration of stoppage, optimize fuel cost that improve efficiency by reducing operational cost can be obtained from a central operating centre through mobile phones or websites using SMS or Internet. Getting real-time and playback data visualization. GSM and GPS based vehicle scrutinizing system uses geographic position and time information from the Global Positioning Satellites (GPS). The system has an "On-Board Module" which resides in the vehicle to be tracked and a "Base Station" that monitors data from the various vehicles. The On-Board module consists of GPS receiver, a GSM modem. The recorded location data can be stored within the tracking unit, or it may be transmitted to a central location data base, or internet-connected computer, using a cellular (GPRS, SMS), radio, or satellite modem embedded in the unit.

In this project Arduino series microcontroller is used for interfacing to various hardware peripherals. The current design is an embedded application, which will continuously monitor a moving vehicle and report the status of the vehicle on demand. For doing so an Arduino series microcontroller is interfaced serially to a GSM Modem and GPS Receiver. A GSM modem is used to send the position (Latitude and Longitude) of the vehicle from a remote place. The GPS modem will continuously give the data i.e. the latitude and longitude indicating the position of the vehicle. The GPS modem gives many parameters as the output. The same data is sent to the mobile at the other end from where the position of the vehicle is demanded. An EEPROM is used to store the mobile number.

II. SYSTEM MODEL

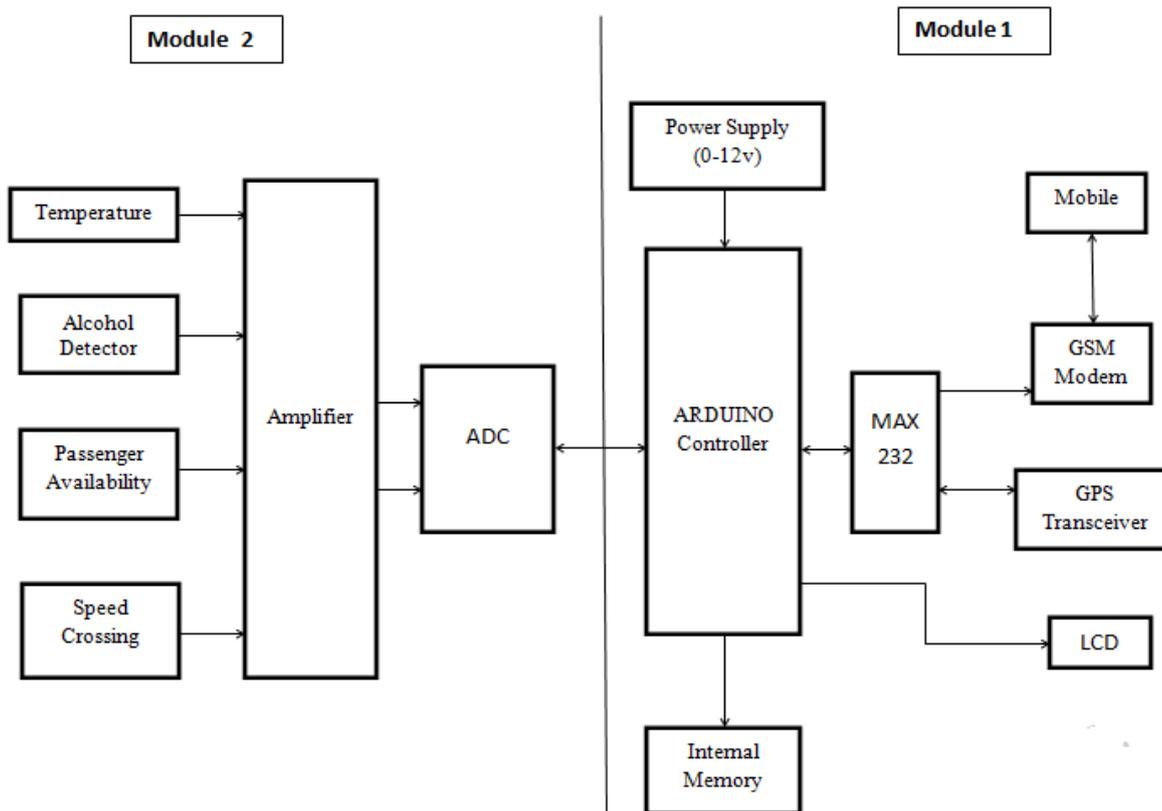
A. To build up our Model

This paper gives design, and implementation of a newly proposed methodology system, that uses the popular social communication media, mobile as a value added service for traditional overseer system. The proposed methodology is focused on improving the technology used to determine the location of a vehicle using different methods like GPS and other radio navigation systems operating through satellites and ground based stations. By following triangulation or trilateration methods the survey system enables to calculate easy and accurate location of the vehicle. Vehicle information like location details, speed, stoppages, accidents, luggage weight, fuel efficiency, distance travelled etc., can be viewed through mobile SMS or Internet.

In the previous system security lock and alarm is implemented in a car. If a burglar can break open the lock, then it becomes easy for the burglar to steal the car. And in old security system if the car is stolen then it is out of the owner control. User doesn't have any awareness about the current location of the vehicle. You can investigate your vehicle by calling to the driver over mobile phone but this not convenient as your driver might give you false information. Here, vehicle scrutinizing using GPS and GSM provides the solution to oversee your vehicle location in real-time and provide better control over your assets. Detailed vehicle location reports enhance your control over movement of goods. Monitor the speed and stoppage points in real-time and calculate the distance travelled and duration of stoppage, optimize fuel cost that improve efficiency by reducing operational cost can be obtained from a central operating centre through mobile phones.

In this proposed system the RF transmitter is attached with the vehicle which has its own identification. This data will be continuously transmitted to the RF receiver connected to the Arduino microcontroller. This GPS will be location the position of vehicle and transmit that data to the microcontroller. Suppose the RF receiver not receiving signal from the

transmitting unit, receiver unit send the signal to the microcontroller, from that we can identify the theft. If the vehicle is theft it automatically sends location of the vehicle to its owner as a SMS through GSM modem. This will be a much simpler and low cost technique compared to others. If a password like SMS is sent by the owner, it automatically stops the vehicle.



Block Diagram

III. PROPOSED TECHNIQUES

A. GPS Technology

The Global Positioning System (GPS) is a space based satellite navigation system that provides location and time information in all weather, anywhere on or near the Earth, where there is an unobstructed line of sight to four or more GPS satellites. It is maintained by the United States government and is freely accessible to anyone with a GPS receiver. The GPS project was developed in 1973 to overcome the limitations of previous navigation systems, integrating ideas from several predecessors, including a number of classified engineering design studies from the 1960s. GPS was created and realized by the U.S. Department of Defence (DOD) and was originally run with 24 satellites. It became fully operational in 1994. A GPS receiver calculates its position by precisely timing the signals sent by GPS satellites high above the Earth. Each satellite continually transmits messages that include

1. The time the message was transmitted
2. Satellite position at time of message transmission

The receiver uses the messages it receives to determine the transit time of each message and computes the distance to each

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satellite using the speed of light. Each of these distances and satellites locations define a sphere. The receiver is on the surface of each of these spheres when the distances and the satellites locations are correct. These distances and satellites locations are used to compute the location of the receiver using the navigation equations. This location is then displayed, perhaps with a moving map display or latitude and longitude; elevation information may be included. Many GPS units show derived information such as direction and speed, calculated from position changes. In a typical GPS operation, four or more satellites must be visible to obtain an accurate result. Four sphere surfaces typically do not intersect. Because of this we can say with confidence that when we solve the navigation equations to find an intersection, this solution gives us the position of the receiver along with accurate time thereby eliminating the need for a very large, expensive, and power hungry clock. The very accurately computed time is used only for display or not at all in many GPS applications, which use only the location. A number of applications for GPS do make use of this cheap and highly accurate timing. These include time transfer, traffic signal timing, and synchronization of cell phone base stations.

B. GSM Technology

A GSM modem is a specialized type of modem which accepts a SIM card, and operates over a subscription to a mobile operator, just like a mobile phone. GSM (Global system for mobile) uses a process called circuit switching. This method of communication allows a path to be established between two devices. Once the two devices are connected, a constant stream of digital data is relayed. GSM networks consist of the major systems the Switching System (SS), The Base Station (BSS) and the Mobile station (MS).

i. The Switching System

The Switching system is very operative system in which many crucial operations are conducted, SS systems holds five databases with in it which performs different functions. If we talk about major tasks of SS system it performs call processing and subscriber related functions. These databases from SS systems are HLR, MSC, VLR, AUC and EIR. The MSC in cooperation with Home Location register (HLR) and Visitor location register (VLR), take care of mobile calls and routing of phone calls. Authentication centre (AUC) is small unit which handles the security end of the system and Equipment identity register (EIR) is another important database which holds crucial information regarding mobile equipment's.

ii. The Base Station System (BSS)

The base station system have very important role in mobile communication. BSS are basically outdoor units which consist of iron rods and are usually of high length. BSS are responsible for connecting subscribers (MS) to mobile networks. All the communication is made in Radio transmission. The Base station System is further divided in two systems. These two systems, they are BTS and BSC. BTS (Base Transceiver station) handles communication using radio transmission with mobile station and BSC (Base station controller) creates physical link between subscriber (MS) and BTS, then manage and controls functions of it.

iii. Mobile Station (Subscriber)

MS consist of a mobile unit and a smart card which is also referred as a subscriber Identity Module (SIM) card. This card fitted with the GSM Modem and gives the user more personal mobility. The equipment itself is identified by a unique number known as the International Mobile Equipment Identity (IMEI).

IV. CONCLUSION

This paper propose a new vehicle overseer and security system, that make use of social communication media as a value added service for traditional scrutinizing systems. For vehicle tracking in real time, in-vehicle unit and a tracking server is used. The information is transferred to Tracking server using GSM/GPRS module on GSM network by direct TCP/IP connection with Tracking server through GPRS. Vehicle information is recorded in tracking server database. This information like vehicle location, Speed Violation Alert/Report (speed of all vehicles can be controlled, monitored, and hence when violated, immediate contact can be made to reduce such violation). Area Alarm (an area can be assigned to vehicles, the owner/authorized person will be notified, if the rule is violated); 'No-Go' area (A 'No-Go' area can be created for the vehicles, the owner/authorized person will be notified, if the rule is violated); in addition, the car owner can find out whether the ignition is on or off; if on, then whether the vehicle is moving or stationary, thus vehicles can be monitored even if they are switched off. Detailed vehicle location reports enhance your control over movement of goods. Monitor the

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speed and stoppage points in real-time and calculate the distance travelled and duration of stoppage, optimize fuel cost that improve efficiency by reducing operational cost can be obtained from a central operating centre through mobile phones or websites using SMS or Internet. Getting real-time and playback data visualization. Currently In-Vehicle unit was implemented with Arduino.

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